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EXAMINER	
GREENE, JASON M	
ART UNIT	PAPER NUMBER
1724	20

DATE MAILED: 07/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Applicati n No.	Applicant(s)	
	09/871,156	BENSON ET AL.	
	Examiner	Art Unit	
	Jason M. Greene	1724	

-- *The MAILING DATE of this communication appears n the c ver sheet with the c rrespondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 18 June 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-35 is/are pending in the application.

4a) Of the above claim(s) 4,14,21 and 28 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-13,15-27 and 29-35 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 13 November 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

Response to Arguments

1. Applicant's arguments regarding the combination of the Kahlbaugh et al. '399 and Teague et al. references with respect to the rejection(s) of claim(s) 1-3, 5-13, 15-20, 22-27, and 29-35 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kahlbaugh et al. '399.

With regard to Applicants' argument that the substrate layer of Kahlbaugh et al. '399 does not possess the claimed permeability and efficiency properties, the Examiner notes that Kahlbaugh et al. '399 explicitly discloses the substrate layer having a permeability of 150-450 m/min (2.5-7.5 m/sec) and an efficiency of up to 10 percent in col. 14, line 63 to col. 15, line 6. While Kahlbaugh et al. '399 teaches a substrate layer having a high permeability and a low efficiency being a preferred embodiment, the Examiner contends that Kahlbaugh et al. '399 explicitly teaches that a substrate layer having a permeability and efficiency within the claimed ranges can also be used. Specifically, the substrate disclosed in the Kahlbaugh et al. '399 reference has a permeability of 150-450 m/min (2.5-7.5 m/sec) while the claimed substrate has a

permeability of 0.03 to 15 m/sec. Likewise, the substrate disclosed in the Kahlbaugh et al. '399 reference has an efficiency of up to about 10 percent while the claimed substrate has an efficiency of greater than 5 percent. Therefore, Kahlbaugh et al. '399 is seen as teaching a substrate having a permeability and efficiency well within the claimed ranges.

With regard to Applicants' argument that the permeability and efficiency of the substrate of Kahlbaugh et al. '399 relied upon by the Examiner are extreme limits and that a substrate having both the claimed permeability and efficiency is outside the scope of the Kahlbaugh et al. '399 teaching, the Examiner notes that disclosed values of the permeability and efficiency away from the extreme limits still read on the claimed ranges. In particular, Kahlbaugh et al. '399 teaches the permeability of the substrate having a lower limit of 150 m/min (2.5 m/sec). However, Kahlbaugh et al. '399 also teaches the permeability of the substrate being 450 m/min (7.5 m/sec). Likewise, while Kahlbaugh et al. '399 teaches the efficiency of the substrate being up to 10 percent, Kahlbaugh et al. also encompasses a substrate having an efficiency between 5 and 10 percent. Furthermore, since permeability and efficiency are inversely proportional, the Examiner notes that a substrate exhibiting a permeability near the lower extreme of the range (150 m/min (2.5 m/sec)) will also exhibit an efficiency near the upper extreme of the range (10 percent).

With regard to Applicants' argument that the filter substrate disclosed in the Kahlbaugh et al. '399 reference is substantially different than the instant filter substrate, the Examiner recognizes that the substrate of the Kahlbaugh et al. '399 filter is intended

to act as a spacer and is not intended to perform a filtration function. However, while the substrates may be intended to perform different functions, the substrate of Kahlbaugh et al. '399 is still seen as inherently performing a filtration function since both the substrate of Kahlbaugh et al. '399 and the instant substrate have the same permeability and efficiency.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 1-3 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kahlbaugh et al. '399.

With regard to claim 1, Kahlbaugh et al. '399 discloses a fine fiber filter media comprising a single layer of filter substrate (14), the substrate having a first surface and a second surface, the substrate having a permeability of 150 m/min - 450 m/min (2.5 – 7.5 m/sec) and an efficiency of up to about 10 percent, the first surface and the second surface each comprising a layer (15,19) of fine fiber having a diameter of 0.1 microns, the layer of fine fiber having a thickness of 2 microns, the fine fiber formed in an amount effective to obtain an overall efficiency under ASTM 1215-89 with monodispersed 0.78 micron polystyrene latex particles at 20 ft/min velocity of between 50 and 90 percent in

any one layer in Fig. 7, col. 3, lines 27-64, col. 4, line 12 to col. 5, line 23, col. 12, lines 38-47, col. 14, lines 1-14, col. 16, lines 34-55, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being 90 percent in col. 4, lines 12-61, the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28 can be used to calculate the efficiency of two layers each having an efficiency of 90 percent to be 1 - (1-0.9)*(1-0.9) = 0.99 = 99 percent.

Kahlbaugh et al. '399 does not explicitly disclose the fine fiber layer having a pore size of about 0.0001 to 5 microns.

Kahlbaugh et al. '399 teaches adjusting the average pore size between adjacent fibers in the web to adjust the efficiency of the layer in col. 12, line 13 to col. 13, line 45 and col. 32, lines 9-63.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the average pore size between fibers in the web to about 0.0001 to 5 microns to provide a layer having a desired efficiency and lifetime for a given application. Additionally, the Examiner notes that the claimed range for the porosity of the fine fiber layer is very broad. Specifically, the Examiner notes that the recited porosity ranges from 0.0002 to 5000 times the claimed fine fiber diameter. Given this broad range, one of ordinary skill in the art would clearly recognize the desirably of selecting a porosity of the fine fiber layer within the claimed range. Furthermore, the Examiner notes that Applicants have not demonstrated the criticality of the claimed range of the porosity of the fine fiber layer.

With regard to claim 2, Kahlbaugh et al. '399 discloses the efficiency of the fine fiber layer on the first surface being different than the efficiency of the fine fiber layer on the second surface in col. 6, lines 4-16 and col. 24, lines 38-56.

With regard to claim 3, Kahlbaugh et al. '399 discloses the efficiency of the fine fiber layer on a downstream surface being greater than the efficiency of the fine filter layer on an upstream surface in col. 24, lines 38-56.

With regard to claim 5, Kahlbaugh et al. '399 discloses the fine fiber being formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 90 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28,

the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7) = 0.91 = 91 percent.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being less than 85 percent and the efficiency of the substrate being about 5 percent to about 80 percent, these limitations are anticipated.

With regard to claims 6 and 8, Kahlbaugh et al. '399 discloses the fine fiber formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 65 percent or the substrate having an efficiency of about 20 percent to about 80 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7) = 0.91 = 91 percent.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to increase the efficiency of the substrate to increase the efficiency of the filter media to reduce the amount of particulate matter passing through the filter media.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being less than 80 percent and about 40 percent to 80 percent, these limitations are anticipated.

With regard to claim 7, Kahlbaugh et al. '399 discloses the fine fiber formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in, col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 65 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7) = 0.91 = 91 percent.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being 40 percent to 85 percent and the efficiency of the substrate being about 5 percent to about 80 percent, these limitations are anticipated.

With regard to claim 9, Kahlbaugh et al. '399 discloses the fine fiber layer being formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the fine fiber being polycarbonate in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 18, col. 16, lines 56-64, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 80 percent or the fine fiber being selected such that after test exposure for a test period of 16 hours to test conditions of 140 ^{0}F and a relative humidity of 100 percent retains greater than 50 percent of the fiber unchanged for filtration purposes.

Since Kahlbaugh et al. teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7) = 0.91 = 91 percent.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges the efficiency of each fine fiber layer being less than 75 percent, this limitation is anticipated.

With regard to claim 10, Kahlbaugh et al. '399 discloses the filter media having an efficiency greater than the efficiency of a single sided media in Fig. 7, col. 14, lines 1-14, col. 24, lines 38-56, and col. 27, lines 36-55. The term single sided media has been taken to mean a filter media having a fine fiber layer on only one surface of a substrate.

Kahlbaugh et al '399 does not disclose the fine fiber forming an interlocking mesh of fiber having on the average a pore size between fibers in the web of less than about 3 microns, wherein the filter media has a lifetime, defined as an increase in pressure drop over the filter of about 3 inches H_2O at test conditions of 10 ft/min.

Kahlbaugh et al. '399 teaches the filter media having a lifetime between 2 and 5 inches H_2O at test conditions of 10 ft/min in col. 33, lines 54-57.

Since the prior art range is seen as overlapping the disclosed range of about 3 inches H_2O, a prima facie case of obviousness exists which must be overcome through a showing of unobvious or unexpected results.

Kahlbaugh et al. '399 teaches adjusting the average pore size between adjacent fibers in the web to adjust the efficiency of the layer in page 32, lines 9-63.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the average pore size between fibers in the web to below about 3 microns to provide a layer having a desired efficiency for a desired application.

4. Claims 11-13, 15-20, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kahlbaugh et al. '399.

With regard to claims 11 and 21, Kahlbaugh et al. '399 discloses a method of removing a particulate from an air borne stream, the particulate comprising a liquid particulate, a solid particulate, or mixtures thereof, the method comprising placing a filter structure in an air stream and directing the air stream through the filter structure while monitoring the useful life of the filter structure, said filter structure comprising a fine fiber filter media and single layer of a filter substrate (14), the substrate having a permeability of 150 m/min (2.5 m/s) and an efficiency of 10 percent, the substrate having a first surface and a second surface, the first surface and the second surface each comprising a layer (15,19) of fine fiber having a diameter of 0.1 microns, the layer of fine fiber having a thickness of 2 microns, the fine fiber formed in an amount effective to obtain an overall efficiency under ASTM 1215-89 with monodispersed 0.78 micron polystyrene latex particles at 20 ft/min velocity of between 50 and 90 percent in any one layer in Figs. 7 and 25, col. 1, lines 5-33, col. 3, lines 27-64, col. 4, line 12 to col. 5, line 23, col. 12, lines 38-47, col. 14, lines 1-14, col. 16, lines 34-55, col. 22, line 55 to col. 23, line 32, col. 27, lines 36-55, and col. 33, lines 35-57.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being 90 percent in col. 4, lines 12-61, the equation provided by Kahlbaugh et al. '399 in col. 23,

lines 26-28 can be used to calculate the efficiency of two layers each having an efficiency of 90 percent to be 1 - (1-0.9)*(1-0.9) = 0.99 = 99 percent.

Kahlbaugh et al. '399 does not explicitly disclose the fine fiber layer having a pore size of about 0.0001 to 5 microns.

Kahlbaugh et al. '399 teaches adjusting the average pore size between adjacent fibers in the web to adjust the efficiency of the layer in col. 12, line 13 to col. 13, line 45 and col. 32, lines 9-63.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the average pore size between fibers in the web to about 0.0001 to 5 microns to provide a layer having a desired efficiency and lifetime for a given application. Additionally, the Examiner notes that the claimed range for the porosity of the fine fiber layer is very broad. Specifically, the Examiner notes that the recited porosity ranges from 0.0002 to 5000 times the claimed fine fiber diameter. Given this broad range, one of ordinary skill in the art would clearly recognize the desirably of selecting a porosity of the fine fiber layer within the claimed range. Furthermore, the Examiner notes that Applicants have not demonstrated the criticality of the claimed range of the porosity of the fine fiber layer.

With regard to claim 12, Kahlbaugh et al. '399 discloses the efficiency of the fine fiber layer on the first surface being different than the efficiency of the fine fiber layer on the second surface in col. 6, lines 4-16 and col. 24, lines 38-56.

With regard to claim 13, Kahlbaugh et al. '399 discloses the efficiency of the fine fiber layer on a downstream surface being greater than the efficiency of the fine filter layer on an upstream surface in col. 24, lines 38-56.

With regard to claim 15, Kahlbaugh et al. '399 discloses the fine fiber being formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 90 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7) = 0.91 = 91 percent.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being less than 85 percent and the efficiency of the substrate being about 5 percent to about 80 percent, these limitations are anticipated.

With regard to claims 16 and 18, Kahlbaugh et al. '399 discloses the fine fiber formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 65 percent or the substrate having an efficiency of about 20 percent to about 80 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7) = 0.91 = 91 percent.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to increase the efficiency of the substrate to increase the efficiency of the filter media to reduce the amount of particulate matter passing through the filter media.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being less than 80 percent and about 40 percent to 80 percent, these limitations are anticipated.

With regard to claim 17, Kahlbaugh et al. '399 discloses the fine fiber formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in, col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 65 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7) = 0.91 = 91 percent.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being 40 percent to 85 percent and the efficiency of the substrate being about 5 percent to about 80 percent, these limitations are anticipated.

With regard to claim 19, Kahlbaugh et al. '399 discloses the fine fiber layer being formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the fine fiber being polycarbonate in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 18, col. 16, lines 56-64, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 80 percent.

Since Kahlbaugh et al. teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be $1 - (1-0.7)*(1-0.7) = 0.91 = 91$ percent.

Since the prior art is seen as disclosing a specific example lying within the claimed range of the efficiency of each fine fiber layer being less than 75 percent, this limitation is anticipated.

With regard to claim 20, Kahlbaugh et al. '399 discloses the filter media having an efficiency greater than the efficiency of a single sided media in Fig. 7, col. 14, lines 1-

14, col. 24, lines 38-56, and col. 27, lines 36-55. The term single sided media has been taken to mean a filter media having a fine fiber layer on only one surface of a substrate.

Kahlbaugh et al '399 does not disclose the fine fiber forming an interlocking mesh of fiber having on the average a pore size between fibers in the web of less than about 3 microns, wherein the filter media has a lifetime, defined as an increase in pressure drop over the filter of about 3 inches H_2O at test conditions of 10 ft/min.

Kahlbaugh et al. '399 teaches the filter media having a lifetime between 2 and 5 inches H_2O at test conditions of 10 ft/min in col. 33, lines 54-57.

Since the prior art range is seen as overlapping the disclosed range of about 3 inches H_2O, a prima facie case of obviousness exists which must be overcome through a showing of unobvious or unexpected results.

Kahlbaugh et al. '399 teaches adjusting the average pore size between adjacent fibers in the web to adjust the efficiency of the layer in page 32, lines 9-63.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the average pore size between fibers in the web to below about 3 microns to provide a layer having a desired efficiency for a desired application.

With regard to claim 22, Kahlbaugh et al. '399 discloses the particulate comprising residual components of combustion in col. 1, lines 28-33.

With regard to claim 23, Kahlbaugh et al. '399 discloses the particulate comprising a fatty oil in col. 32, lines 16-19.

With regard to claim 24, Kahlbaugh et al. '399 discloses the particulate comprising soot and grit in col. 1, lines 14-33. The soot is seen as being the exhaust from an engine, such as a diesel engine and the grit is seen as being particulate matter in the intake air stream of an engine.

5. Claims 25-27 and 29-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kahlbaugh et al. '399.

With regard to claim 25, Kahlbaugh et al. '399 discloses a filter structure comprising one layer of filter substrate (14,18,21) and three or more layers of fine fiber, the substrate layer having a first surface and a second surface, the substrate layer having a permeability of 150 m/min (2.5 m/sec) and an efficiency of 10 percent, the surfaces comprising three or more layers of the fine fiber on the substrate, each fine fiber layer comprising fine fiber having a diameter of 0.1 microns, the dine fiber layer having a thickness of 2 microns, the fine fiber formed in an amount effective to obtain an overall efficiency under ASTM 1215-89 with monodispersed 0.78 micron polystyrene latex particles at 20 ft/min velocity of between 50 and 90 percent in any one layer in Fig. 7, col. 3, lines 27-64, col. 4, line 12 to col. 5, line 23, col. 12, lines 38-47, col. 14, lines 1-14, col. 16, lines 34-55, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55. Kahlbaugh et al. '399 discloses a filter being formed by applying a fine fiber layer to a first and second side of a substrate in col. 27, lines 38-45. Kahlbaugh et al. '399 further

discloses the filter structure being formed by joining two of the filters together such that two fine fiber layers are adjacent one another on each side of the substrate in col. 27, lines 52-55. Therefore, the filter structure is seen as comprising a substrate having 4 layers (2 on each side) of fine fibers on the surfaces of the substrate.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being 90 percent in col. 4, lines 12-61, the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28 can be used to calculate the efficiency of two layers each having an efficiency of 90 percent to be 1 - (1-0.9)*(1-0.9) = 0.99 = 99 percent.

Kahlbaugh et al. '399 does not explicitly disclose the fine fiber layer having a pore size of about 0.0001 to 5 microns.

Kahlbaugh et al. '399 teaches adjusting the average pore size between adjacent fibers in the web to adjust the efficiency of the layer in col. 12, line 13 to col. 13, line 45 and col. 32, lines 9-63.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the average pore size between fibers in the web to about 0.0001 to 5 microns to provide a layer having a desired efficiency and lifetime for a given application. Additionally, the Examiner notes that the claimed range for the porosity of the fine fiber layer is very broad. Specifically, the Examiner notes that the recited porosity ranges from 0.0002 to 5000 times the claimed fine fiber diameter. Given this broad range, one of ordinary skill in the art would clearly recognize the desirably of selecting a porosity of the fine fiber layer within the claimed range. Furthermore, the

Examiner notes that Applicants have not demonstrated the criticality of the claimed range of the porosity of the fine fiber layer.

With regard to claim 26, Kahlbaugh et al. '399 discloses the efficiency of a fine fiber layer on the first surface being different than the efficiency of a fine fiber layer on the second surface in col. 6, lines 4-16 and col. 24, lines 38-56.

With regard to claim 27, Kahlbaugh et al. '399 discloses the efficiency of a fine fiber layer on a downstream surface being greater than the efficiency of a fine filter layer on an upstream surface in col. 24, lines 38-56.

With regard to claim 29, Kahlbaugh et al. '399 discloses the sheet-like substrate having a thickness of 0.03 inches (0.762 mm) in col. 15, lines 6-28.

Since the prior art is seen as disclosing a specific example lying within the claimed range of about 0.3 to 1 millimeter, this limitation is anticipated.

With regard to claims 30 and 31, Kahlbaugh et al. '399 discloses the fine fiber being formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of the layers of fine fibers being greater than 85 or 90 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7)(1-0.7)*(1-.07) = 0.9919 = 99.19 percent.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being less than 80 and 85 percent, these limitations are anticipated.

With regard to claim 32, Kahlbaugh et al. '399 discloses the fine fiber formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in, col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of the layers of fine fibers being greater than 65 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular

application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7)*(1-0.7)*(1-0.7)= 0.9919 = 99.19 percent.

Since the prior art is seen as disclosing specific examples lying within the claimed ranges of the efficiency of each fine fiber layer being 40 percent to 85 percent and the efficiency of the substrate being about 5 percent to about 80 percent, these limitations are anticipated.

With regard to claim 33, Kahlbaugh et al. '399 discloses the fine fiber formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the substrate having an efficiency of 10 percent in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 6, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. '399 does not explicitly disclose the combined efficiency of the layers of fine fibers being greater than 65 percent or the substrate having an efficiency of about 20 percent to about 80 percent.

Since Kahlbaugh et al. '399 teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28,

the efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7)*(1-0.7)*(1-0.7) = 0.9911 = 99.19 percent.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to increase the efficiency of the substrate to increase the efficiency of the filter media to reduce the amount of particulate matter passing through the filter media.

Since the prior art is seen as disclosing a specific example lying within the claimed range of the efficiency of each fine fiber layer being about 40 percent to 80 percent, this limitation is anticipated.

With regard to claim 34, Kahlbaugh et al. '399 discloses the fine fiber layer being formed in an amount effective, in each layer, to obtain an efficiency of between 50 and 90 percent and the fine fiber being polycarbonate in col. 4, line 12 to col. 5, line 23, col. 14, line 60 to col. 15, line 18, col. 16, lines 56-64, col. 22, line 55 to col. 23, line 32, and col. 27, lines 36-55.

Kahlbaugh et al. does not explicitly disclose the combined efficiency of both layers of fine fibers being greater than 80 percent.

Since Kahlbaugh et al. teaches the efficiency in any one layer being between 50 and 90 percent in col. 4, lines 12-61, one of ordinary skill in the art at the time the invention was made would have recognized that each layer could have been selected to have an efficiency of 70 percent to provide a filter media for a particular application. Using the equation provided by Kahlbaugh et al. '399 in col. 23, lines 26-28, the

efficiency of two layers each having an efficiency of 70 percent can be calculated to be 1 - (1-0.7)*(1-0.7)*(1-0.7)*(1-0.7) = 0.9919 = 99.19 percent.

Since the prior art is seen as disclosing a specific example lying within the claimed range of the efficiency of each fine fiber layer being less than 75 percent, this limitation is anticipated.

With regard to claim 35, Kahlbaugh et al. '399 discloses the filter media having an efficiency greater than the efficiency of a single sided media in Fig. 7, col. 14, lines 1-14, col. 24, lines 38-56, and col. 27, lines 36-55. The term single sided media has been taken to mean a filter media having a fine fiber layer on only one surface of a substrate.

Kahlbaugh et al '399 does not disclose the fine fiber forming an interlocking mesh of fiber having on the average a pore size between fibers in the web of less than about 3 microns, wherein the filter media has a lifetime, defined as an increase in pressure drop over the filter of about 3 inches H_2O at test conditions of 10 ft/min.

Kahlbaugh et al. '399 teaches the filter media having a lifetime between 2 and 5 inches H_2O at test conditions of 10 ft/min in col. 33, lines 54-57.

Since the prior art range is seen as overlapping the disclosed range of about 3 inches H_2O, a prima facie case of obviousness exists which must be overcome through a showing of unobvious or unexpected results.

Kahlbaugh et al. '399 teaches adjusting the average pore size between adjacent fibers in the web to adjust the efficiency of the layer in page 32, lines 9-63.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the average pore size between fibers in the web to below about 3 microns to provide a layer having a desired efficiency for a desired application.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (703) 308-6240. The examiner can normally be reached on Tuesday - Friday (7:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine Copenheaver can be reached on (703) 308-1261. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Jason M. Greene
Examiner
Art Unit 1724

jmg
July 10, 2003

DUANE SMITH
PRIMARY EXAMINER
7-11-03